Citation:

Dauchet L, Amouyel P, Hercberg S, Dallongeville J. Fruit and vegetable consumption and risk of coronary heart disease: a meta-analysis of cohort studies.*J Nutr.* 2006 Oct;136(10):2588-93.

PubMed ID: 16988131

Study Design:

Meta-Analysis

Class:

M - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

POSITIVE: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To assess, through meta-analysis, the magnitude of the relation between fruit and vegetable consumption and the risk of coronary heart disease (CHD).

Inclusion Criteria:

- Only prospective cohort studies were used for the meta-analysis
- Cohort studies were selected if they reported relative risks and 95% confidence intervals for coronary heart disease or mortality and if they presented a quantitative assessment of fruit and vegetable intake

Exclusion Criteria:

- Articles in languages other than English
- Studies that reported cardiovascular events only
- Studies that reported combined cerebro- and cardiovascular events
- Individual fruits or vegetables

Description of Study Protocol:

Recruitment

- Searches were conducted in electronic databases (MedLine and EMBASE) from 1970 to January 2006
- References from the extracted papers, reviews, and previous meta-analysis were also consulted to complete the data bank
- The electronic search included both free-text and MESH terms and was performed with the support of the laboratory librarian
- Search terms were described

- No attempt was made to contact authors of unpublished works or find articles in languages other than English.

Design: Meta-Analysis

Blinding used (if applicable): not applicable

Intervention (if applicable): not applicable

Statistical Analysis

- Pooled relative risks were calculated for each additional portion of fruit and/or vegetables consumed per day assuming a log-linear model
- Linearity of the associations were examined
- Heterogeneity among studies was assessed by Cochran's Q test
- Possibility of publication bias was assessed by funnel plot analysis and the Egger test

Data Collection Summary:

Timing of Measurements

Not applicable.

Dependent Variables

- Risk of coronary heart disease (CHD): fatal and non-fatal myocardial infarction, ischemic heart disease mortality or coronary death, and coronary heart disease incidence

Independent Variables

- Fruit and vegetable consumption: individual fruits and vegetables were not included
- Method involved a computation of the fruit and vegetable intake and not just the frequency of intake
- Food intake was assessed by means of food records, diet history records, and food frequency questionnaires

Control Variables

Description of Actual Data Sample:

Initial N: 20 studies were identified.

Attrition (final N): 9 studies eligible for inclusion, consisting of 221,080 subjects (91,379 men, 129,701 women) and 5,007 CHD events.

- 4 studies were excluded for CHD events were pooled with cardiovascular or cerebrovascular events
- 4 studies were excluded because the food frequency questionnaire did not assess the quantity of fruit and/or vegetable intake
- 3 studies were excluded because there were insufficient data to extrapolate the relative risks

Age: see Results

Ethnicity: not specified

Other relevant demographics:

Anthropometrics

Location: Finland and USA

Summary of Results:

Key Findings:

- The risk of CHD was decreased by 4% (RR = 0.96, 95% confidence interval: 0.93 - 0.99, P = 0.0027) for each additional portion per day of fruit and vegetable intake and by 7% (RR = 0.93, 95% confidence interval: 0.89 - 0.96, P < 0.0001) for fruit intake.
- The association between vegetable intake and CHD risk was heterogeneous (P = 0.0043), more marked for cardiovascular mortality (RR = 0.74, 95% confidence interval: 0.75 - 0.84, P < 0.0001) than for fatal and nonfatal myocardial infarction (RR = 0.95, 95% confidence interval: 0.92 - 0.99, P = 0.0058).

Cohort	Authors and Publication Date	Location	Men / women	Age	Years of follow-up
Health Professionals Follow-up Study	Joshipura et al, 1999	USA	38,683 / 0	40 - 75	8
Nurses' Health Study	Joshipura et al, 1999	USA	0 / 75,596	34 - 59	14
Women's Health Study	Liu et al, 2000	USA	0 / 39,127	mean 54	5
Physicians' Health Study	Liu et al, 2001	USA	15,220 / 0	40 - 84	12
Alpha-Tocopherol Beta-Carotene Cancer Prevention Study	Hirvonen et al, 2001	Finland	25,372 / 0	50 - 69	6.1
NHANES Follow-Up Study	Bazzano et al, 2002	USA	3684 / 5924	25 - 74	19
Atherosclerosis Risk in Communities (ARIC)	Steffen et al, 2003	USA	5171 / 6669	45 - 64	11
Mobile Clinic of Social Insurance	Knekt et al, 1994	Finland	2748 / 2385	30 - 69	14

Baltimore Longitudinal Study of Aging (BLSA)	Tucker et al, 2005	USA	501 / 0	mean 62	18

Other Findings

- Visual inspection of the funnel plot suggested a publication bias, although not statistically significant
- Therefore, the reported RRs are probably overestimated

Author Conclusion:

In conclusion, this analysis presents evidence of a beneficial association between fruit and vegetable consumption and CHD risk, supporting the recommendation to eat a sufficient amount of fruit and vegetables to lower CHD risk. The strength of this association, however, is still uncertain because of a possible publication or selection bias. Furthermore, because observational studies do not control for unmeasured confounders, the causal mechanisms remain to be established in randomized controlled trials. Finally, this study also points out the limited availability of cohort studies to analyze the relation between fruit and/or vegetable intake and CHD risk in Europe and Asia.

Reviewer Comments:

Analysis of the relation between vegetable intake and CHD risk revealed heterogeneity among studies.

Research Design and Implementation Criteria Checklist: Review Articles

Relevance Questions		
1.	Will the answer if true, have a direct bearing on the health of patients?	Yes
2.	Is the outcome or topic something that patients/clients/population groups would care about?	Yes
3.	Is the problem addressed in the review one that is relevant to nutrition or dietetics practice?	Yes
4.	Will the information, if true, require a change in practice?	Yes

Validity Questions		
1.	Was the question for the review clearly focused and appropriate?	Yes
2.	Was the search strategy used to locate relevant studies comprehensive? Were the databases searched and the search termsused described?	Yes
3.	Were explicit methods used to select studies to include in the review? Were inclusion/exclusion criteria specified and appropriate? Were selection methods unbiased?	Yes

4.	Was there an appraisal of the quality and validity of studies included in the review? Were appraisal methods specified, appropriate, and reproducible?	Yes
5.	Were specific treatments/interventions/exposures described? Were treatments similar enough to be combined?	Yes
6.	Was the outcome of interest clearly indicated? Were other potential harms and benefits considered?	Yes
7.	Were processes for data abstraction, synthesis, and analysis described? Were they applied consistently across studies and groups? Was there appropriate use of qualitative and/or quantitative synthesis? Was variation in findings among studies analyzed? Were heterogeneity issued considered? If data from studies were aggregated for meta-analysis, was the procedure described?	Yes
8.	Are the results clearly presented in narrative and/or quantitative terms? If summary statistics are used, are levels of significance and/or confidence intervals included?	Yes
9.	Are conclusions supported by results with biases and limitations taken into consideration? Are limitations of the review identified and discussed?	Yes
10.	Was bias due to the review's funding or sponsorship unlikely?	Yes